TES Instrument Operations Status/Plans

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TES IOT
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TES Key Activities and Macro Changes (9/2005 to 9/2006)

- Optical Bench Warm-up 12/2005
- Procedural Changes in TES De-icing (Post Optical Bench Warm-up) 2/2006
- Modified Global Survey & ICS Performance Macros 1/2006

TES Key Activities and Macro Changes (Cont)

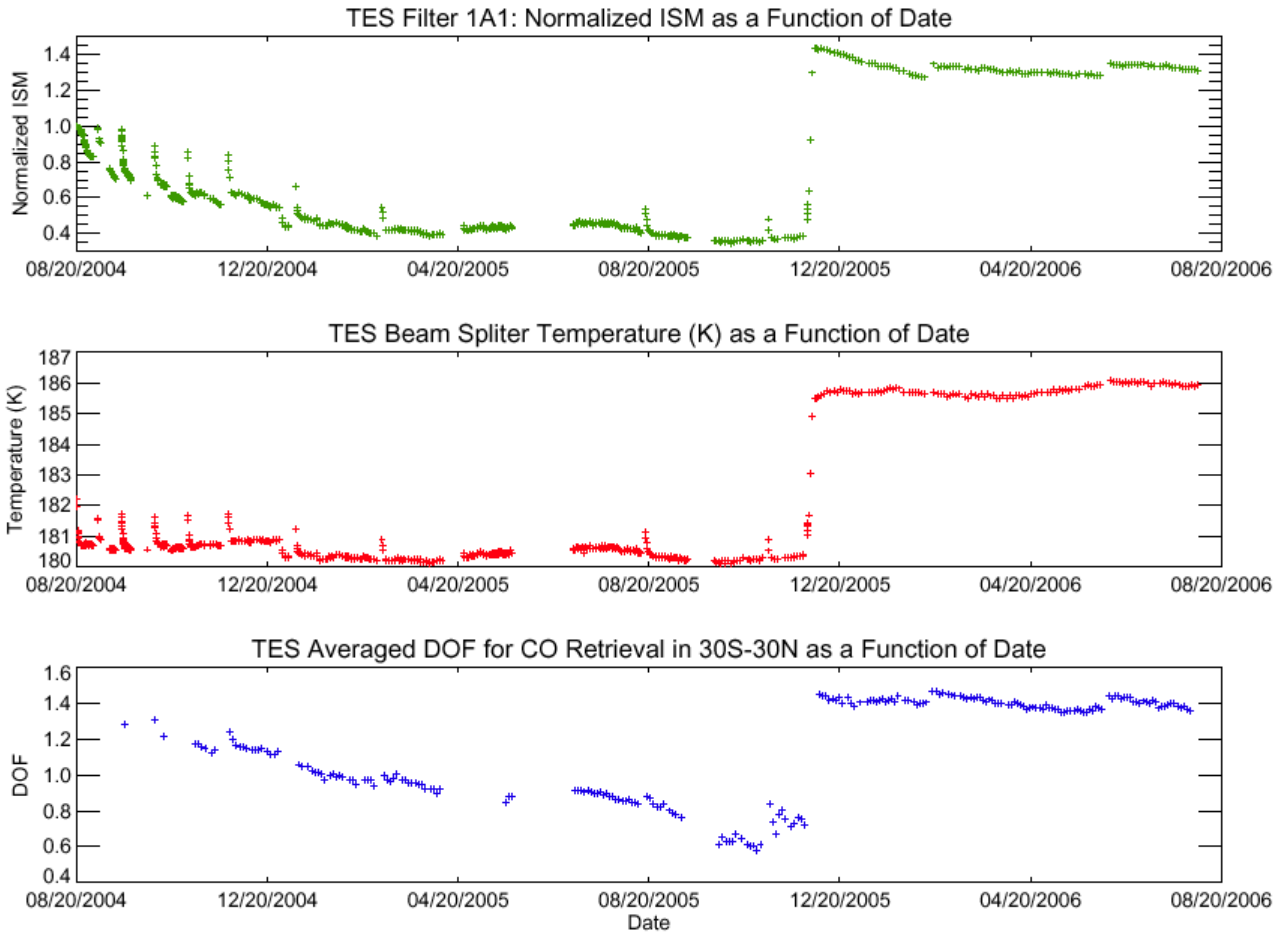
(9/2005 to 9/2006)

- Optical Bench Warm-up
  - Warming up the TES Optical Bench to improve Carbon Monoxide (CO) retrievals.
  - CO retrieval is directly dependent on the signal levels in the 1A1 detector.
  - Interferometer optics alignment, and hence signal levels, are strongly dependent on the temperature of the optical bench.
  - Level 1 CO requirements could be achieved by increasing the interferometer temperature by five to six degrees from 180 K to 186 K
  - The Optical Bench Quiet Bus Decontamination (Decon) Heaters had to be used in lieu of the to Optical Bench Operational Heaters to raise the Optical Bench to 186 K
  - Integrated spectral magnitude (ISM) is a sensitive measure of signal levels at the TES detectors.
    - ISM is calculated by integrating a spectrum over wave number
    - Higher ISM implies higher SNR as well as improved retrieved product precision
  - ISM is the primary quantity used to monitor and trend TES instrument performance and alignment
    - ISM data collected during the optical bench warm-up is the primary quantity used to judge the progress and efficacy of the warm-up process

TES Key Activities and Macro Changes (Cont)

(9/2005 to 9/2006)

Optical Bench Warm-up Continued



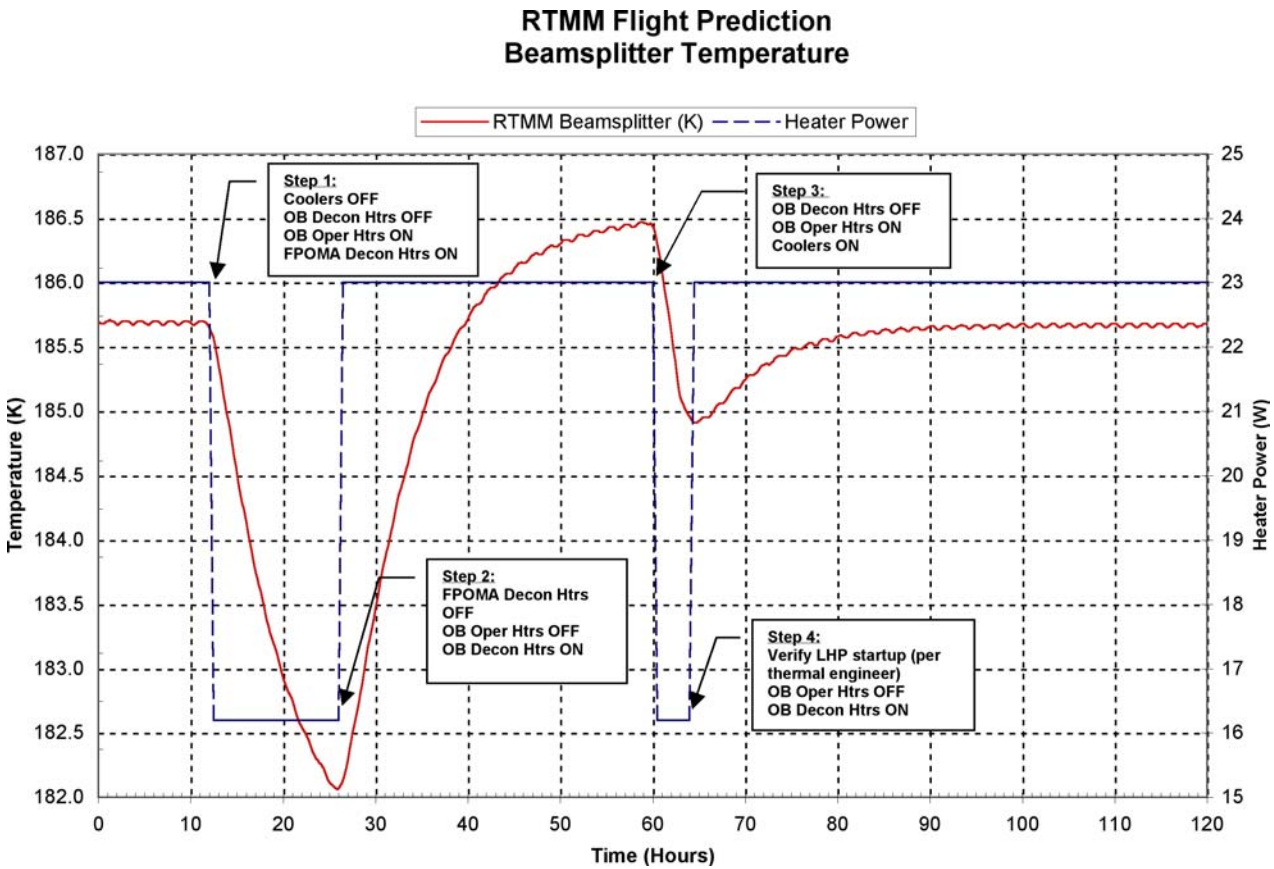
TES Key Activities and Macro Changes (Cont)

(9/2005 to 9/2006)

- Procedural Changes in TES De-icing (Post Optical Bench Warm-up)
  - To exercise the procedure and products needed to support TES De-icing (to eliminate H_2O from the detectors) while in the new heater configuration post Optical Beach Warm-up
  - Heater Configuration and Constraints:
    - The OB Operational Heaters were used to heat the Optical Beach while the FPOMA Decon Heaters were turned on to heat the detectors
    - The OB QB Decon Heaters were used to maintain the Optical Bench Temperature when the FPOMA Decon Heaters were turned off
    - Constraints prohibited the OB QB Decon Heaters from being turned on while the OB Operational Heaters or FPOMA Decon Heaters were in use
    - The OB QB Decon Heaters were turned off prior to turning ON the cryo-coolers since the OB QB Decon Heaters could not be enable during the activation of the Loop Heat Pipes.

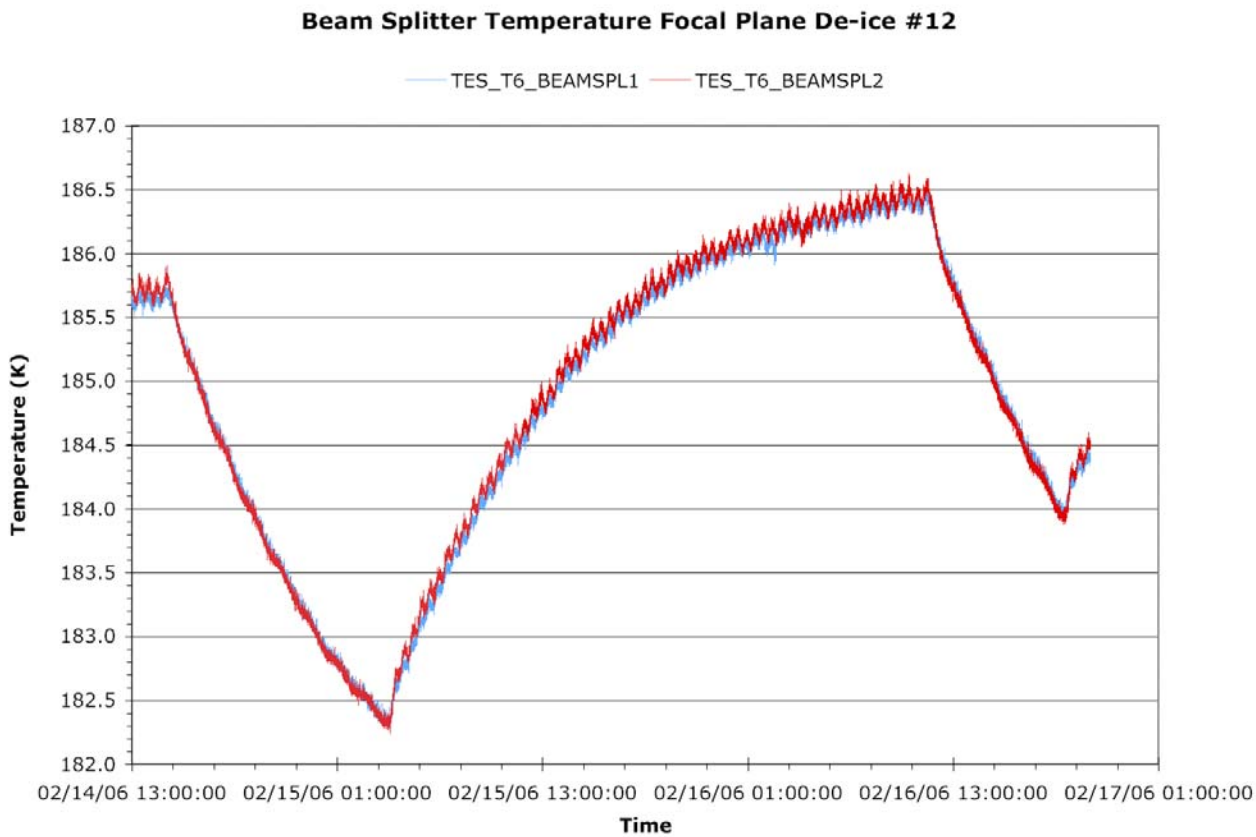
TES Key Activities and Macro Changes (Cont)

(9/2005 to 9/2006) **Post Optical Bench De-ice Continued**



TES Key Activities and Macro Changes (Cont)

(9/2005 to 9/2006) **Post Optical Bench De-ice Continued**



TES Key Activities and Macro Changes (Cont)

(9/2005 to 9/2006)

- Modified Global Survey & ICS Performance Macros
  - Generated and uplinked new Global Survey Macros to perform periodic long scans to re-distribute ICS bearing lubricant
  - Generated and uplinked a new ICS Performance Macro that is more fault tolerant and reduces the risk of tripping an ICS Over Current Fault

TES Key Activities and Macro Change Summary

(9/2005 to 9/2006)

- TES Optical Bench Warm-up was a success; Detector 1A1 ISM was increased from ~207 to ~783, above the goal of 625
- Post Optical Bench De-Icing was successful; the de-icing was complete and worked with the new heater configuration
- The new macros uplinked have helped to stabilize the ICS motor current

TES Instrument Operations and Health Monitoring

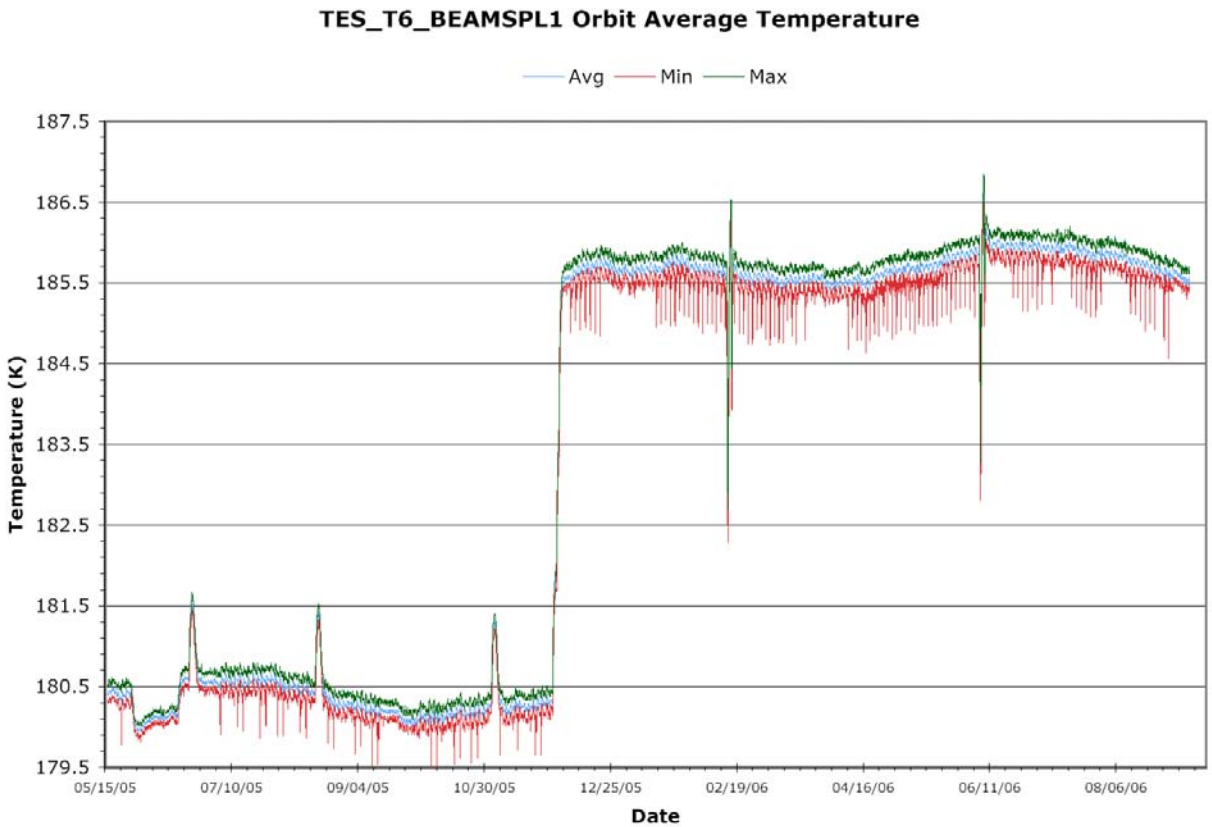
- **TES Instrument Operations are proceeding on plan**
  - The TES IOT continues to schedule stored sequence activities from the Instrument Support Terminal (IST) at JPL on the MMS System :
    - Global Surveys and Special Observations
    - ICS and PCS Performance Sequences
    - Filter Wheel Movement Maintenance Sequence
    - Radiometric Assessment Calibration
    - DRAM and EEPROM Maintenance Sequences bi-weekly
  - Routine real-time activities are performed at the IST via DMZ System:
    - Focal Plane De-icing
    - New Macro (Sequence) Loads
    - New Macro Parameter Table (MPT) Loads
    - Other Table Loads (e.g., Fault Threshold)
    - Sequence Dumps
    - Table Dumps
  - Daily Instrument Status Meeting held with Management to report of critical subsystem parameters
    - Reports on instrument data are generated from real-time telemetry or TES VCDU data when real-time data is not accessible
    - Instrument Events or Error Messages are summarized
  - The TES Engineering Model (EM) or Test-bed is used to verify new load files before use on the Flight system, and to investigate anomalies

TES Instrument Operations and Health Monitoring (Cont)

- The following instrument subsystem characteristics are monitored for health and safety, and are nominal:
  - Power:
    PCAA Quiet Bus, PCAB Quiet and Noisy Bus, PCAC Quiet Bus, VME Voltages and Currents, and ICS Motor Current
  - Laser:
    Laser A Power and Temperatures
  - Mechanical Coolers:
    Cold head, base plate and electronic temperatures, and Drive stroke and vibration
  - Passive Coolers:
    180K and 230K passive cooler radiator temperatures
  - Temperatures:
    RCS, Beam splitter, Optical Bench, Filter Wheels, Focal Plane Assemblies, PCS motor and mirrors, and Fore-optics and Translator temperatures
  - ICS:
    ICS motor over current events

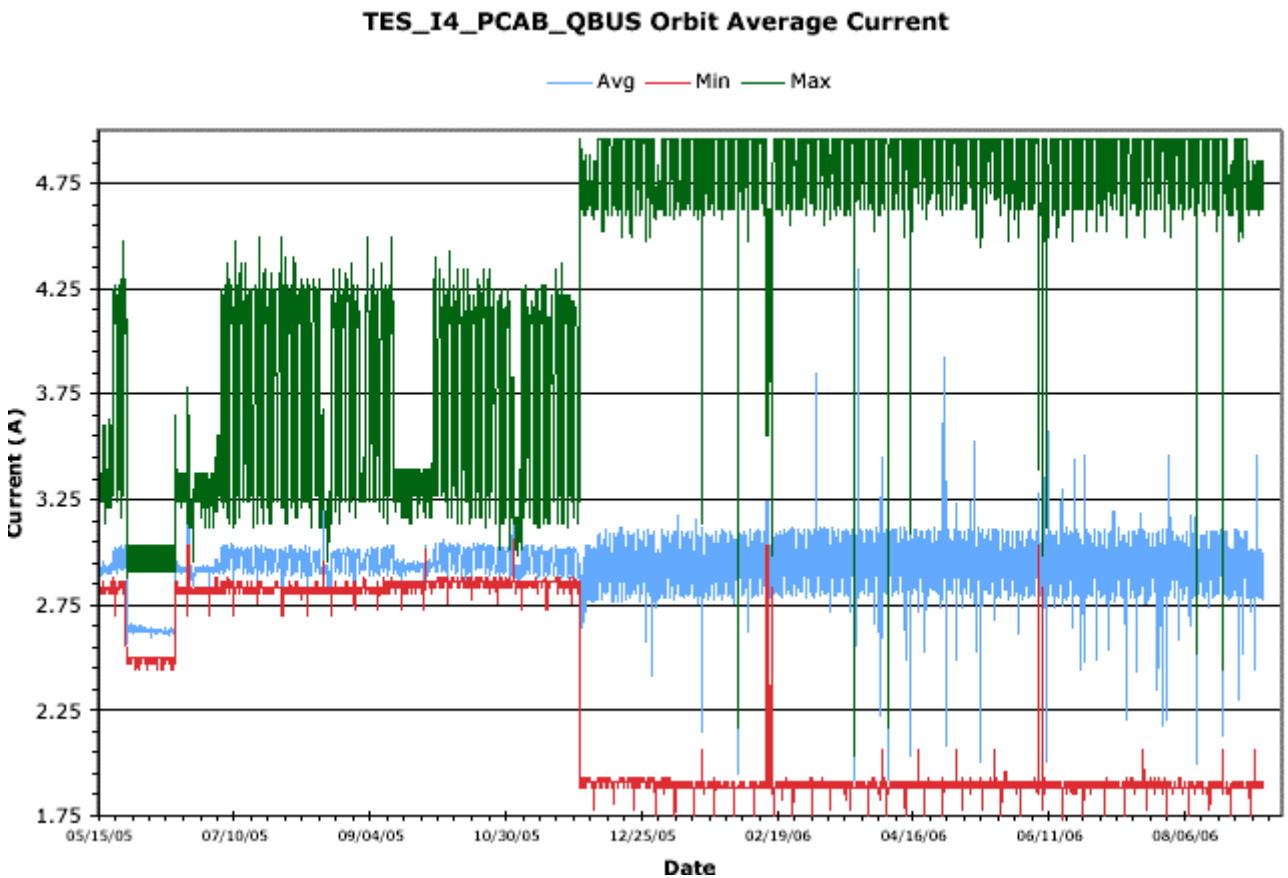
TES Instrument Operations and Health Monitoring (Cont)

Sample Plot 1



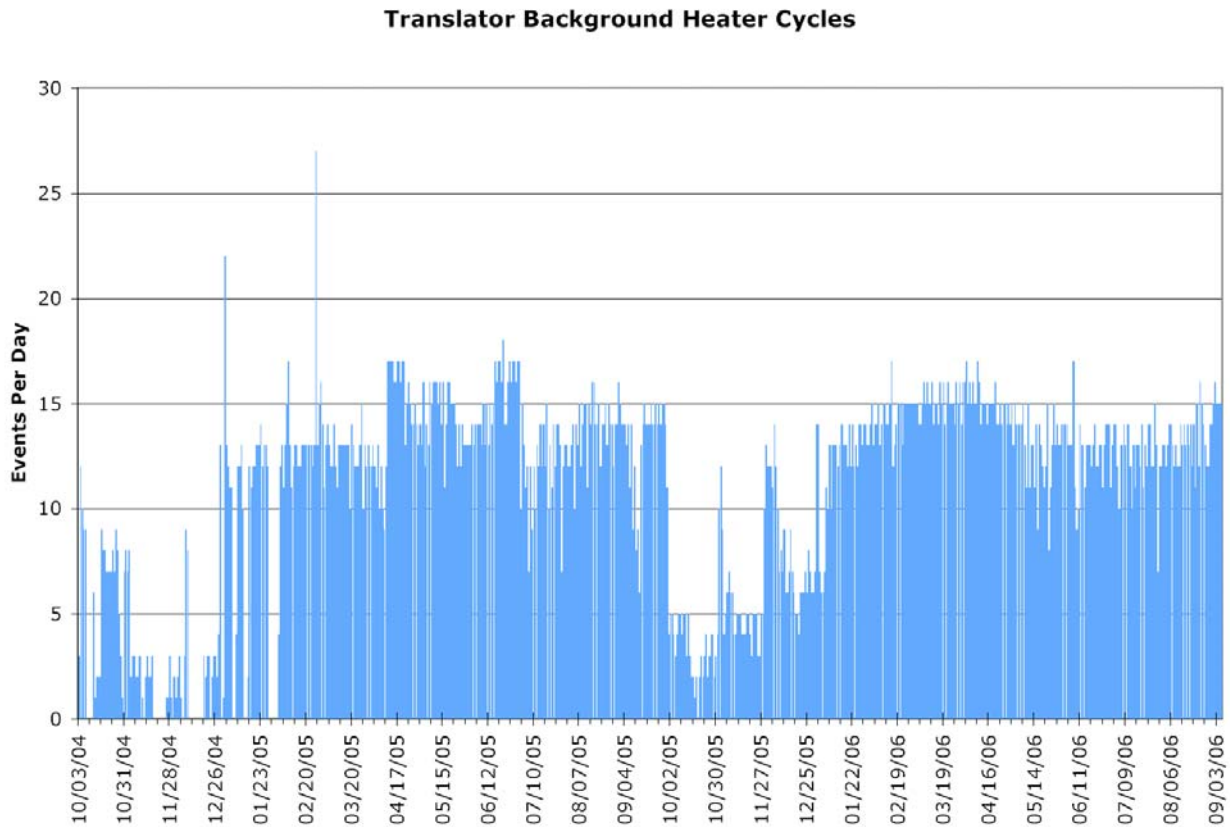
TES Instrument Operations and Health Monitoring (Cont)

Sample Plot 2



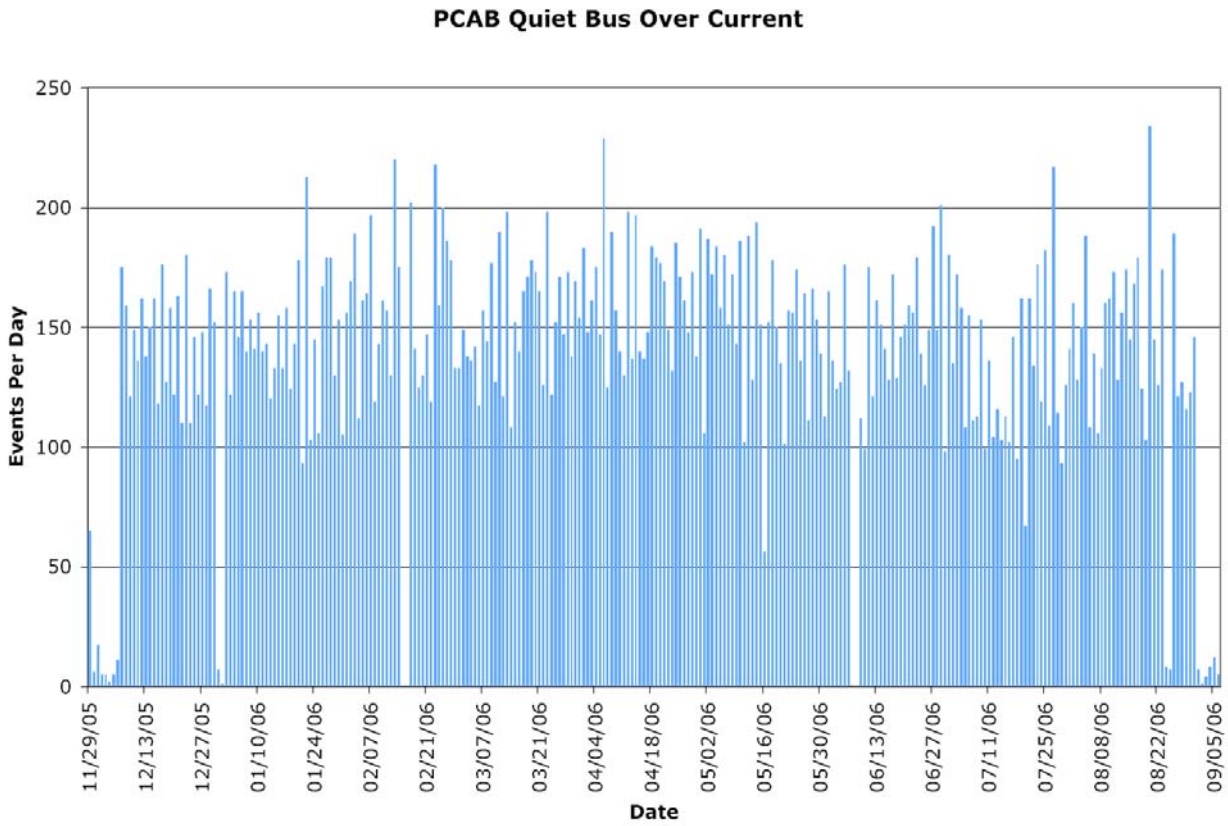
TES Instrument Operations and Health Monitoring (Cont)

Sample Plot 3



TES Instrument Operations and Health Monitoring (Cont)

Sample Plot 4



Executed TES Science Activities

- **171 Planned Global Surveys from 9/30/05 to 9/7/06**
  - 92 percent were executed
  - There were 14 Global Surveys canceled:
    - 5 due to Periodic Focal Plane De-icing (Nov 1- 3, 2005 & Feb 14 – Feb 16, 2006)
    - 4 due to Optical Bench Warm-up (Nov 29 – Dec 3, 2005)
    - 1 due to Leap Second Addition (Dec 31, 2005)
    - 1 due to an Aura Inclination Maneuver (Aug 31, 2006)
    - 3 due to FW Anomaly (Aug 31 - Sept 8, 2006)

Executed TES Science Activities (Cont)

- **Special Observation (SO) Campaigns:**
  - Transect measurements made in South America for fire scene identification studies (August 20 – Sept 2, 2005)
  - Stare only observation near Lake Tahoe (August 20 – Sept 7, 2005)
  - Transect over Ticosonde Costa Rica (1/2006 to 2/2006)
  - Step & Stare, Off-track Transect and Limb measurements were made near Costa Rica to support Costa Rica Aura Validation Experiment (CRAVE) campaign and ozone sonde launches at Costa Rica and Galapagos Is (January 16 – Feb 9, 2006)
  - Off-track Transect measurements were made near Southern Great Plane (SGP) ARM site in collaborating with radio sondes and ozone sonde launches during AIRS validation campaign. Also, two transect measurements were made near Nauru (January 18 – Feb 28, 2006)
  - Two orbits of limb observations were made for TES – HIRDLS comparison (February 13, 2006)
  - INTEX-B 2006. 50 Step & Stare measurements were made near Huston/Mexico City to support INTEX-B / MILAGRO campaigns and IONS ozone sonde launches (February 23 – March 29 , 2006)
  - SAUNA-2006. Six off-track Transect measurements were made together with Global Surveys during the time period to support SAUNA campaign over Sondankyla, Finland (March 24 – April 14, 2006)
  - INTEX-B 2006. 94 Step & Stare and 94 Limb special measurements were made in Mid/North Pacific Ocean, N/E Asia, and N/W America to support INTEX-B campaign based in Hawaii (April 11 – 30, 2006)
  - INTEX-B 2006. 99 Step & Stare and 99 Limb special measurements were made in Mid/North Pacific Ocean, N/E Asia, and N/W America to support INTEX-B / IMPEX campaign based in Anchorage / Seattle (May 01 – 20, 2006)
  - Step & Stare observations covering N America, N Atlantic ocean and Europe for studying summer time transatlantic pollution and sources (July 04 – Aug 21, 2006)
  - Transect observations in support of WAVE campaign (July 11, 27, and Aug 12, 2006)
  - Step & Stare observations covering N America in supporting of Texas Air Quality campaign (TexAQS-II) (Aug 23 – Sept 16, 2006)

Future Operation Plans

- Continue with Global Survey Schedule
- Continue to support Special Observation Campaigns as they become defined by the TES Science Team

IST/EMOS-Related Problems & Concerns

- Real-Time Data Loss during Commanding
- DMZ workstation disconnects ~twice per week
- Auto Operations Concept for Solid State Recorder (SSR) – 1 packet data loss per SSR per dump

TES Mission Operations Personnel Updates

- Padma Varanasi (Operational Lead)
- Robert Murdock (Operation Team)
- Jeffrey Mart (Operation Team)
- Rob Toaz (Project Manager)
- Reinhard Beer (Principal Investigator)
- David Rider (Instrument Scientist)

Michael Papin has moved on to another project